

REMARKS

The applicants have carefully studied the outstanding Office Action. The applicants gratefully acknowledge the Examiner's withdrawal of the finality of the previous Office Action, and his indication that claims 127, 150, 152-157, 177 and 178 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Since the applicants respectfully submit that, as a result of the arguments presented in this amendment, the independent base claim concerned (claim 112) should be deemed allowable, the applicants prefer not to rewrite these claims in independent form until examination as to the merits of the base claim has been carried out. The present response is intended to be fully responsive to all points of rejection raised by the Examiner, and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application are respectfully requested.

Claim amendments

Claims 160 and 161 have been amended by replacing the term "by means of" with the term "by use of".

Claim 168 has been amended to include antecedent basis for the zero calibration channel.

Claim 180 has been amended by replacing the word "determining" in the last element of the claim with the word "detecting", to bring the nomenclature used in claim 180 to that of claim 112, with which it otherwise has considerable commonality. The applicants claim that no new subject matter has been added by this replacement.

Claim rejections - 35 USC § 112 - second paragraph

Claims 162 (understood to mean claim 161) and 168 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 161, as so understood, is rejected for two reasons: the presence of a superfluous "." in the middle of the claim, and use of the phrase "by means of", which could create confusion as to whether or not the sixth paragraph of 35 U.S.C. 112 is intended to be evoked. Claim 161 has been amended by using the term "by use of" instead of "by means of", and the erroneous "." has been deleted from claim 161. The applicants have similarly replaced the term "by means of" in claim 160.

Claim 168 is rejected in that there is no antecedent basis for the zero calibration channel in claim 112. Claim 168 has been amended to include such antecedent basis.

The applicants therefore respectfully submit that claims 161 and 168, are free of the grounds for rejection under 35 U.S.C. 112, second paragraph, and respectfully request withdrawal of such rejection.

Claim rejections - 35 USC § 102

Claims 180, 182 and 184 stand rejected under 35 U.S.C. 102(b) as being anticipated by Fabinsky et al. (US 5,486,699). The Examiner asserts that Fabinsky shows "an isotopic gas analyzer comprising first and second light sources S1 and S2 having wavelengths characteristic of a first and a second isotopic component, first and second sample chamber K1 and K2 each with a sample of gas to be analyzed, a first reference chamber CC1, having a gas with the first isotopic component therein, a second reference chamber CC2 with a gas having the second isotopic component therein, a first detector E1 detecting transmission through K1 and CC1 of radiation at a wavelength characteristic of the first isotopic component and a second detector E2 detecting transmission through K2 and CC2 of radiation at a wavelength characteristic of a second isotopic component. The detectors detect transmission simultaneously."

All spectrometers must have a means of defining the wavelength or wavelengths at which the absorption is being measured. In the system described in Fabinsky et al., selection of the wavelength or wavelengths characteristic of the isotopic component to be measured is performed by means of wavelength sensitizing of the detectors to the specific wavelengths to be measured, as described in col. 2, lines 18-21, and in col. 5, lines 8-10 and 15-17, and not by use of a source having specific wavelengths characteristic of the isotopic component to be measured. In the only two locations in the application of Fabinsky et al., where the sources are mentioned, each of the sources S1 and S2 are described in col. 2, line 12 as merely "an infrared radiator", and in col. 4, line 61 as merely "a ray source". The applicants respectfully submit that although these sources must have wavelengths which include at least some of the "wavelengths characteristic of a first and a second isotopic component", nowhere in Fabinsky et al., is there mentioned or suggested, use of a "wavelength-stable source of radiation of wavelengths characteristic of first and second isotopic components", as recited in claim 180 of the present application.

The applicants therefore respectfully submit that claim 180 is not anticipated by Fabinsky et al., and is therefore deemed allowable. Claims 181-190 and claim 192 are all dependent on claim 180 and recite further patentable subject matter. Claims 181-190 and claim 192 are therefore also deemed patentable.

Claim rejections - 35 USC § 103(a)

Claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 stand rejected under 35 U.S.C 103(a) as being unpatentable over Sauke et al., in view of Fabinsky et al. The Examiner states that "Sauke et al has a device for measuring a $^{13}\text{CO}_2/^{12}\text{CO}_2$ ratio including sample chamber and a reference chamber 68 and 70, where the reference chamber has a reference gas containing both the first and second isotopic species (see column 7, lines 45-55). Rather than having two measuring chambers and two reference chambers, the device has one measuring and one reference chamber, where the light from the light source is cycled from a first wavelength characteristic of a first isotopic species to a second wavelength

characteristic of a second isotopic species and passed through each chamber. Fabinski shows a system for making the same measurement, where it has 2 sample and 2 reference chambers, each receiving only one of the two measuring wavelengths. From this teaching, it would have been obvious to modify Sauke to use the measuring arrangement of Fabinski, so as to reduce the complexity of design of the system and to reduce measurement time. The system of the combination further has a detectors that simultaneously receive the light beams that pass through the chambers.”

The Examiner asserts that it would have been obvious to modify Sauke et al., to use the measuring arrangement of Fabinski et al., so as to reduce the complexity of design of the system and to reduce measurement time. However, such modification of the system of Sauke et al., to use the measuring arrangement of Fabinsky et al., is impossible, since the method by which the measurements are done in the two systems is mutually exclusive, and teach away from each other. Thus, Sauke et al., teaches the use of separate channels and detectors for each of the sample and reference channels. This mandates the use of detectors which are able to measure both isotope characteristic wavelengths. Fabinsky et al., on the other hand, has separate channels for each isotopic measurement, and describes the use of detectors which are “sensitized” to detect **only** the isotopic species to be measured in that channel. The applicants therefore respectfully submit that this combination of the teachings of Sauke et al., with those of Fabinsky et al., to render claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 as obvious, is erroneous.

Furthermore, with regard to the use of multiple chambers, Sauke et al., specifically teaches in a direction away from that of Fabinsky et al. In col. 8, lines 6-10 of Sauke et al., it is stated “Indeed, the present invention envisions that the reference cell 70 and null beam portion 51 can be omitted and the sample cell 68 alternately charged with sample gas, evacuated, and recharged with reference gas to assume the function of the reference cell 70 and the null beam portion 51.” The applicants understand therefrom that this is the most advantageous direction of construction taught by Sauke et al., which, with regard to the essentiality of multiple chambers, is in complete apposition to the teachings of Fabinsky et al. Thus, to the best of the applicants’ understanding, “the reduction of the complexity of design of the system”

envisaged by Sauke et al., would be in the use of a **single** chamber for all functions, which is a construction completely opposed to that of Fabinsky et al., and even more so to that described in the present claimed invention. For this reason also, the applicants respectfully submit that it would not be obvious to combine these teachings of Sauke et al., with those of Fabinsky et al., and that claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 should not be considered unpatentable over Sauke et al., in view of Fabinsky et al.

In addition to the above arguments, the applicants respectfully add that there is no reason for combining the teachings of Sauke et al., with those of Fabinsky et al., since neither of these patents show or suggest how their respective teachings should or could be combined.

Claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al., in view of Fabinski et al., as applied to claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 above, and further in view of Eckstrom.

The applicants respectfully submit that the Examiner's base assertion, that claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 stand rejected under 35 U.S.C 103(a) as being unpatentable over Sauke et al., in view of Fabinsky et al., is incorrect, for the reasons stated above. Therefore, no combination of other art, such as Eckstrom, in combination with Sauke et al., in view of Fabinski et al., can render claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192 as obvious.

Claims 120, 123, 124, 137, 138, 147-149 and 151 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al in view of Fabinski, as applied to claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 166-168 and 173 above, and further in view of Rosenfeld. The applicants respectfully submit that the grounds for this rejection too are incorrect, for the reasons stated above regarding the obviousness rejection of claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192.

Claim 121 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al in view of Fabinski, and Eckstrom as applied to claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192 above, and further in view of Rosenfeld. The applicants respectfully submit that the grounds for this rejection too are incorrect, for the reasons stated above regarding the obviousness rejection of claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192.

Claim 162 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al in view of Fabinski, as applied to claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 166-168 and 173 above, and further in view of Kiefer. The applicants respectfully submit that the grounds for this rejection too are incorrect, for the reasons stated above regarding the obviousness rejection of claims 113, 115, 117, 119, 122, 126, 139-146, 159, 170-172, 174-176, and 191-192.

Claim 179 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al., in view of Eckstrom et al., and Rosenfeld et al. The Examiner asserts that "Sauke et at., shows a device with a single source that emits two wavelengths of light that travel through a sample reference, and null chamber, and 3 detectors one for each chamber. Eckstrom further teaches that a single source and multiple sources for producing one wavelength each are equivalent. Hence, it would have been obvious to modify Sauke to use multiple sources, as it is merely the substitution on one known equivalent for another. In addition, Eckstrom teaches using a chopper, which is a detection differentiator, as claimed. The above combination does not use a gas discharge lamp. Rosenfeld et al., is a gas analyzer that does. From this teaching, it would have been obvious to modify the above combination to use a gas discharge lamp, as it is merely the substitution of one known light source for another."

The applicants respectfully submit that there are a number of differences between the Examiner's above-quoted description of what is described in the cited references, and the recited elements of claim 179, which these references are asserted to render obvious.

In the first place, to the best of the applicants' understanding, nowhere in either Sauke et al., or in Eckstrom are there shown or suggested sources operating with respective first and second different timing characteristics. The chopper described in

Eckstrom is provided to modulate the source radiation, but nowhere is there any mention or suggestion that this modulation be performed with different timing characteristics for the different sources. On the contrary, the invention of Eckstrom teaches away from the use of such sources with different timing characteristics, since in Eckstrom, in col. 7, lines 23-25, it is stated that "In operation of the apparatus, the four optical paths are exposed to radiation in a rapid repeated sequence", and in col. 10, lines 29-34, it is further stated that "Each of the four optical paths of the invention, as described above, is traversed by source radiation in repeated rapid succession, preferably by means of vacuum activated shutters, to allow repeated measuring and averaging of the respective signals, with minimal opportunity for drift between measurements." This description by Eckstrom, of sequential measurement of each of the four channels, makes the need for different timing characteristics of each source superfluous, since the measurements from the different sources are **not** made simultaneously. Different timing characteristics are only necessary to provide the currently claimed detection differentiator with differently labeled signals, labeled by means of their timing characteristics, in order to differentiate between sources measured **simultaneously**, while Eckstrom differentiates between sources by measuring them **sequentially**.

Furthermore, the applicants respectfully submit that since Eckstrom teaches the use of a chopper to modulate the source, the chopper cannot therefore be considered, as asserted by the Examiner, to be "a **detection differentiator**", and certainly not "a **detection differentiator receiving an output from said at least two detectors and distinguishing outputs corresponding to said first and second gas discharge lamps on the basis of said first and second different timing characteristics**" (emphasis added), as recited in claim 179 of the present invention. The applicants respectfully submit that none of the recitations outlined in bold type above, of the last element of claim 179 of the present invention, are to be found in any aspects, either mentioned or suggested, regarding the chopper described in Eckstrom, and that the chopper of Eckstrom cannot therefore be used in combination with what is disclosed in Sauke et al., to render claim 179 of the present application obvious.

Claims 181, 183, 185-187 and 190 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Fabinski et al., in view of Eckstrom.

Claim 188 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fabinski et al., in view of Rosenfeld et al.

Claim 189 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fabinski et al., in view of Eckstrom as applied to claims 181, 183, 185-187 and 190 above, and further in view of Rosenfeld.

The applicants respectfully submit that claims 181, 183 and 185-190 are all dependent on claim 180, which is deemed allowable, and add further patentable subject matter. Claims 181, 183 and 185-190 are therefore also deemed allowable.

Prior art of record

The Examiner has cited prior art made of record and not relied upon, which is considered pertinent to the applicants' disclosure, in that they describe the use of reference gases having both isotopic components.

The applicants have carefully studied the cited prior art, U.S. Patent No. 5,317,156 to D.E. Cooper et al., for "Diagnostic tests using near-infrared laser absorption spectroscopy", and U.S. Patent No. 5,929,442 to Y. Higashi for "Apparatus for and method of analyzing carbon isotopes", and to the best of their understanding thereof, neither affect the patentability of any of the applicants' claims, either alone or in combination with any of the other cited prior art.

Conclusion


The applicants therefore respectfully submit that, for the reasons mentioned above, claims 112-126, 128-149, 151, 158-176 and 179-192 are novel, are unobvious over the prior art combination cited by the Examiner, and recite patentable material. Claims 112-126, 128-149, 151, 158-176 and 179-192 are therefore deemed to be allowable. The applicants also respectfully submit that objected-to claims 127, 150, 152-157, 177 and 178, are all ultimately dependent on deemed allowable independent claim 117, and recite additional patentable matter, and are therefore all also allowable.

Reconsideration and prompt allowance of this application are therefore
respectfully requested.

Respectfully submitted

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Dated: New York, New York
October 19, 2004

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